ADDENDUM A. PROGRAM EFFECTS ON OTHER (AQUATIC OR TERRESTRIAL) ESA-LISTED POPULATIONS. (Anadromous salmonid effects are addressed in Section 2)

15.1) List all ESA permits or authorizations for USFWS ESA-listed, proposed, and candidate salmonid and non-salmonid species associated with the hatchery program.

1. FWS # 1-9-99-I-112 (bull trout).
2. FWS # MCFRO – 4 (bull trout, research).

15.2) Describe USFWS ESA-listed, proposed, and candidate salmonid and non-salmonid species and habitat that may be affected by hatchery program.

Endangered:

Gray Wolf (*Canis lupus*)

Status:

The gray wolf was listed as endangered in 1978. Gray wolves originally occupied much of the continental Unites States, but currently occupy a small portion of their former range (Laufer and Jenkins 1989). In 1930, it was believed that breeding populations of wolves in Washington were extinct because of fur trading pressure in the 1800's followed by the establishment of bounties on all predators in 1871 in the Washington Territory (Young and Goldman 1944). The last reported wolf shot in the North cascades was in 1975 (WDW 1975, as reported in Almack *et al.* 1993). Recent observations indicate that wolves exist in Washington, likely in small numbers, and mostly as individuals. However, several family units have been documented, indicating that some level of reproduction has occurred recently (Almack and Fitkin 1998).

Range:

The probable range of gray wolves in Washington is in the Cascade Mountains and northeastern Washington (Almack and Fitkin 1998). In northeastern Washington, the majority of the reported wolf activity is in the eastern half of the Colville National Forest and Colville Indian Reservation and also adjacent private and public lands (Hansen 1986).

Habitat Requirements:

The habitat of the gray wolf is listed as open tundra and forests (Whitaker 1980). However, gray wolves can use a variety of habitats as long as cover and a food supply are available (Stevens and Lofts 1988). They tend to focus on areas that are free from human disturbance and harassment, have low road densities and which support large numbers of prey species (deer, elk, goat, moose, and beaver). While they may consume some small mammals, most of their diet consists of deer (Peterson 1986). Wolves follow the movements of ungulate herds (deer, elk, moose) across openings and through forested areas. The major tree species in this area include white pine, lodge pole pine, Douglas fir, larch, subalpine fir, grand fir, and a number of less common species including ponderosa

pine, whitebark pine, spruce, hemlock, and red cedar (Hansen 1986). Wolves have territories ranging from 70-800 square miles. Wolves generally live in packs made up of 2 to 12 or more family members and individuals, lead by a dominant male and female. In other locations, denning by wolves generally occurs between April and June. Den sites are often characterized by having forested cover nearby and by being distant from human activity. The pups remain at the denning site for the first six to eight weeks, then move to a rendezvous site until they are large enough to accompany the adults on a hunt (Peterson 1986). Once the pups are large enough to go hunting, the pack travels throughout its territory.

Wenatchee Mountain checker-mallow *(Sidalcea oregana var. calva*)

Status:

The Wenatchee Mountain checker-mallow is listed as endangered under the Endangered Species Act.

Range:

Although the species of *Sidalcea oregana* (Oregon checker-mallow) occurs throughout the western United States, *S. oregana var. calva* is known only in the Wenatchee Mountains of central Washington. Five known populations, totaling 3,300 plants, occur in the Icicle Creek and Peshastin Creek Watersheds and on the Camas Lands in Chelan County. The primary threats to this species include alterations of hydrology, rural residential development and associated activities, competition from native and alien plants, recreation, fire suppression, and activities associated with fire suppression. To a lesser extent, threats include livestock grazing, road construction, and timber harvesting and associated impacts including changes in surface runoff in the small watersheds in which the plant occurs (USDI 1997).

Habitat Requirements:

The Wenatchee Mountain checker-mallow is most abundant in moist meadows that have surface water or saturated upper soil profiles during spring and early summer. It may also occur in open conifer stands dominated by *Pinus ponderosa* and *Pseudotsuga menziesii* and on the margins of shrub and hardwood thickets. Populations are found at elevations ranging from 1,900 to 4,000 feet. Soils are typically clay-loam and silt-loams with low moisture permeability. The Wenatchee Mountain checker mallow is a perennial plant with a stout taproot that branches at the root crown and gives rise to several stems that are 20 to 150 centimeters in length. Pink flowers begin to appear in middle June and peaks in the middle to end of July. Fruits are ripe by August (USDI 1997).

Showy stickseed *(Hackela venusta)*

Showy stickseed is a perennial, herbaceous plant in the Borage family (Boraginaceae). The plant is a short, moderately stout species, 8 to 16 inches in height, and forms 5-lobed, white flowers. Showy stickweed grows on sparsely vegetated, granitic scree on unstable, steep slopes on the east slope of the central Cascade Mountains of Washington. The species has always been restricted in its distribution, the one population is found entirely on USDA Forest Service land.

The only known population of Showy stickseed in the world, occurs on less than 2.5 acres, located in Tumwater Canyon near Leavenworth, WA. The major threats to the species are collection, physical disturbance to the habitat, intense wildfire, and changes to the composition of the plant community brought on by fire suppression. In addition, highway maintenance activities, low seed production, poor germination, competition from native trees and shrubs, and non-native noxious weeds that encroach upon the habitat of Showy stickseed threaten the species.

No Showy stickseed is found on hatchery grounds, or in the immediate area surrounding the facility.

Threatened:

Bald Eagle *(Haliaeetus leucocephalus)*

Status:
In 1978, the bald eagle was federally listed throughout the lower 48 States as endangered except in Michigan, Minnesota, Wisconsin, Washington, and Oregon, where it was designated as threatened (USDI 1978). In July 1995, the USFWS reclassified the bald eagle to threatened throughout the lower 48 states. In 1999, the bald eagle was proposed for de-listing, recovered throughout the lower 48 States. This proposal is currently under review (USFWS July 1999). Eagles are further protected under the Bald and Golden Eagle Protection Act (BGEPA 1940) and the Migratory Bird Treaty Act of 1918 (MBTA 1918). Bald eagle populations have increased in number and expanded their range. The improvement is a direct result of recovery efforts including habitat protection and the banning of DDT and other persistent organochlorines. The 1996 information provided by the Washington Department of Fish and Wildlife (WDFW unpub. data) indicates that 589 nests were known to be occupied and 0.93 young/nest were produced. This is well above the recovery goal of 276 pairs for Washington, but below the recovery criteria of an average of 1.00 young/nest..

Habitat loss continues to be a long-term threat to the bald eagle in the Pacific Recovery Area of Washington, Idaho, Nevada, California, Oregon, Montana, and Wyoming. Urban and recreational development, logging, mineral exploration and extraction, and other forms of human activities are adversely affecting the suitability of breeding, wintering, and foraging areas.

Range:
The bald eagle is found throughout North America. The largest breeding populations in the contiguous United States occur in the Pacific Northwest states, the Great Lake states, Chesapeake Bay and Florida. The bald eagle winters over most of the breeding range, but is most concentrated from southern Alaska and southern Canada southward. Most nesting territories in Washington are located on the San Juan Islands, the Olympic Peninsula coastline, and along the Strait of Juan De Fuca, Puget Sound, Hood Canal, and the Columbia River. In addition, bald eagle nesting territories are found within southwestern Washington, the Cascade Mountains, and in the eastern part of the state where adequate sources of prey are available. Most bald eagles winter on river systems in

the Puget Trough and the Olympic Peninsula, along the outer coast and Strait of Juan De Fuca, or in the Columbia River Basin.

Habitat Requirements:
In Washington, bald eagles are most common along the coasts, major rivers, lakes and reservoirs (USFWS 1986). Bald eagles require accessible prey and trees for suitable nesting and roosting habitat (Stalmaster 1987). Food availability, such as aggregations of waterfowl or salmon runs, is a primary factor attracting bald eagles to wintering areas and influences the distribution of nests and territories (Stalmaster 1987; Keister *et al.* 1987).

Bald eagle nests in the Pacific Recovery Area are usually located in uneven aged stands of coniferous trees with old growth forest components that are located within one mile of large bodies of water. Factors such as relative tree height, diameter, species, form, position on the surrounding topography, distance from the water, and distance from disturbance appear to influence nest site selection. Nests are most commonly constructed in Douglas fir or Sitka spruce trees, with average heights of 116 feet and size of 50 inches dbh (Anthony *et al.* 1982 in Stalmaster 1987). Bald eagles usually nest in the same territories each year and often use the same nest repeatedly. Availability of suitable trees for nesting and perching is critical for maintaining bald eagle populations. The average territory radius ranges from 1.55 miles in western Washington to 4.41 miles along the lower Columbia River (Grubb 1976, Garrett *et al.* 1988). In Washington, courtship and nest building activities normally begin in January, with eaglets hatching in mid-April or early May. Eaglets usually fledge in mid-July (Anderson *et al.* 1986).

A number of habitat features are desirable for wintering bald eagles. During the winter months bald eagles are known to band together in large aggregations where food is most easily acquired. The quality of wintering habitat is tied to food sources and characteristics of the area that promote bald eagle foraging. Key contributing factors are available fish spawning habitat with exposed gravel bars in areas close to bald eagle perching habitat. Bald eagles select perches that provide a good view of the surrounding territory, typically the tallest perch tree available within close proximity to a feeding area (Stalmaster 1987). Tree species commonly used as perches are black cottonwood, big leaf maple, or Sitka spruce (Stalmaster and Newman 1979). Wintering bald eagles may roost communally in single trees or large forest stands of uneven ages that have some old growth forest characteristics (Anthony *et al.* 1982 in Stalmaster 1987). Some bald eagles may remain at their daytime perches through the night but bald eagles often gather at large communal roosts during the evening. Communal night roosting sites are traditionally used year after year and are characterized by more favorable microclimatic conditions. Roost trees are usually the most dominant trees of the site and provide unobstructed views of the surrounding landscape (Anthony *et al.* 1982 in Stalmaster 1987). They are often in ravines or draws that offer shelter from inclement weather (Hansen *et al.* 1980; Keister *et al.*1987). A communal night roost can consist of two birds together in one tree, or more than 500 in a large stand of trees. Roosts can be located near a river, lake, or seashore and are normally within a few miles of day use areas but can be located as far away from water as 17 miles or more. Prey sources may be

available in the general vicinity, but close proximity to food is not as critical as the need for shelter that a roost affords (Stalmaster 1987).

Bald eagles utilize a wide variety of prey items, although they primarily feed on fish, birds and mammals. Diet can vary seasonally, depending on prey availability. Given a choice of food, however, they typically select fish. Many species of fish are eaten, but they tend to be species that are easily captured or available as carrion. In the Pacific Northwest, salmon form an important food supply, particularly in the winter and fall. Birds taken for food are associated with aquatic habitats. Ducks, gulls and seabirds are typically of greatest importance in coastal environments. Mammals are less preferred than birds and fish, but form an important part of the diet in some areas. Deer and elk carcasses are scavenged, and in coastal areas, eagles feed on whale, seal, sea lion and porpoise carcasses (Stalmaster 1987).

Grizzly Bear (*Ursus arctos*)

Status:
The grizzly bear was listed as a threatened species in the conterminous United States in 1975. Livestock depredation control, habitat deterioration, commercial trapping, unregulated hunting, and protection of human life were leading causes of the decline of grizzly bears (USFWS 1993). Two of the six ecosystems identified in the grizzly bear recovery plan (USFWS 1993) include areas in Washington, the Northern Cascades and the Selkirks. Almack *et al.* (1993) estimated the 1991 grizzly bear population in the North Cascades recovery area at less than 50, and perhaps as low as 5 to 20. Wielgus *et al.* (1994) estimated a density of one bear per 27 mi^2 (71 km^2) for the U.S. portion of the Selkirks Ecosystem and one per 17 mi^2 (43 km^2) for the Canadian portion of the Selkirks Ecosystem.

Range:
In Washington, the grizzly's range is limited to the Northern Cascades and the Selkirk mountains.

Habitat Requirements:
Grizzly bear habitat use is determined by isolation from human disturbance, food distribution and availability, and denning security. In general, grizzly bears move seasonally, using low elevation riparian areas and meadows in the spring, higher elevations during the summer and fall months, and high isolated areas for winter denning. Little is known about the grizzly bears residing in the North Cascades. It is suspected that their habits are similar to bears from other areas, but telemetry studies are needed. Information presented here is from studies in the Selkirk Mountains and other areas. Denning occurs most commonly on north-facing slopes above 6000 feet elevation in areas where snow drifts and remains through warm spells (USFS 1994). Grizzly bears leave their den sites after the cubs are born in February. They move quickly down to low elevation areas and feed on winter-killed ungulates and new growth. Grizzly bears generally feed on emerging grasses, forbs, and budding shrubs in the spring. As green-up moves up-slope, the bears follow, foraging above 3000 feet in the summer. Grizzly bears breed on their summer range between May and July. In late summer and fall, bears

forage on berries such as huckleberry, serviceberry, rose, and strawberry. In September or October bears move to high elevations and denning sites. Grizzly bears may concentrate their use in mixed shrub fields, snow chutes, old burns, meadows, and cutting units.

Human disturbance, usually increased with road access into grizzly habitat, is known to affect bear use of seasonal habitat components. Habituation or avoidance may result. In general, roads increase the probability of bear-human encounters and human-induced mortality (USFS 1994).

Northern Spotted Owl (*Strix occidentalis caurina*)

Status:

The northern spotted owl was listed as federally threatened in June 1990. The Northern Spotted Owl Recovery Team reported a total of about 3,602 known pairs of spotted owls in Washington, Oregon, and California; with 671 pairs in Washington (USDI 1992b). Based on two sets of assumptions to develop estimates, Holthausen *et al.* (1994 in WDNR 1997) estimated 282 or 321 pairs of spotted owls on the Olympic Peninsula, which was higher than previous estimates.

A demographic analysis of results from 5 sites distributed throughout the spotted owls range indicated that female territorial spotted owls were declining between 6 to 16 percent per year (an average of 10 percent) at individual study sites (Anderson and Burnham 1992 in WDNR 1997). Burnham *et al.* (1994 in WDNR 1997) estimated an annual loss of 3-8 percent of the resident female owls on the Olympic Peninsula using unadjusted estimates of juvenile survival. Using an adjusted estimate of juvenile survival, they estimated an annual loss of 1 percent of the resident females. Threats to existing populations of spotted owls include declining habitat, low populations, limited and highly fragmented habitat, isolation of populations, predation and competition (USDI 1992b).

Range:

The northern spotted owl is one of three subspecies (northern, California, and Mexican) and occurs from British Columbia to northern California. The northern spotted owl is associated with late successional and old growth forest habitats. The owl also occurs in some younger forest types where the structural attributes of old growth forests are present (WDNR 1997). The present range of the northern spotted owl is similar to the limits of its historic range (USDI 1992a).

Habitat requirements:

Detailed accounts of the taxonomy, range, and habitat requirements of northern spotted owls may be found in the 1990 Fish and Wildlife Service status review (USFWS 1990); the 1987 and 1989 status review supplements (USFWS 1987, 1989), and the Interagency Scientific Committee Report (Thomas *et al.* 1990).

Spotted owls nest, roost, and feed in a wide variety of habitat types and forest stand conditions throughout their distribution, with most observations in areas having a component of old growth and mature forests. Owls in managed forests usually occupy areas with structural diversity and a high degree of canopy closure, containing large diameter or residual old trees, in stands more than 60 years old (USDI 1992b).

Nesting habitat is generally found in mature and old growth stands and contains a high degree of structural complexity (WDNR 1997). Cavities or broken-top trees are more frequently selected in older forests and platforms (mistle toe brooms, abandoned raptor and gray squirrel nests, and debris accumulations) tend to be selected more frequently in younger forests (Foresman *et al.* 1984, LaHaye *et al.* 1992). Roosting habitat has characteristics similar to nesting habitat, i.e., high canopy closure, a multi-layered canopy, and large diameter trees (WDNR 1997). Spotted owls roost in shady spots near streams in the summer (WDNR 1997). Spotted owls begin their annual breeding cycle in late winter (February or March) and dispersal of juvenile owls begins in early fall (USDI 1992b).

Feeding habitat appears to be the most variable of the major habitat categories (Thomas *et al.* 1990); however it is characterized by high canopy closure and complex structure (USDI 1992b). Spotted owls feed on a variety of small forest mammals, birds, and insects. Spotted owls on the Olympic Peninsula depend primarily on flying squirrels (Carey *et al.* 1992).

Although habitat that allows spotted owls to disperse may be unsuitable for nesting, roosting, or foraging, it provides an important linkage among blocks of nesting habitat both locally and over the range of the northern spotted owl. This linkage is essential to the conservation of the spotted owl. Dispersal habitat, at minimum, consists of forest stands with adequate tree size and canopy closure to protect spotted owls from avian predators and to allow the owls to forage at least occasionally (USDI 1995).

Designated Critical Habitat for Northern Spotted Owl (*Strix occidentalis caurina*)

On January 15, 1992, approximately 6.88 million acres (2.8 million hectares) was designated as critical habitat for the northern spotted owl in Washington, Oregon, and California. These critical habitat areas included most of the Habitat Conservation Areas defined in the Interagency Scientific Committee Report (Thomas *et al.* 1990) and added areas around and between them. Fifty-three critical habitat units were identified in Washington.

The USFWS's primary objective in designating critical habitat was to identify existing spotted owl habitat and to highlight specific areas where management consideration should be given highest priority (USDI 1992a). To assist in these determinations, the USFWS relied on the following principles identified in Thomas *et al.* (1990): 1) develop and maintain large contiguous blocks of habitat to support multiple reproducing pairs of owls; 2) minimize fragmentation and edge effect to improve habitat quality; 3) minimize

distance to facilitate dispersal among blocks of breeding habitat; and 4) maintain range-wide distribution of habitat to facilitate recovery (USDI 1992a).

The following qualitative criteria were considered when determining whether to select specific areas as critical: 1) presently suitable habitat emphasized; 2) large contiguous blocks of habitat emphasized; 3) quality of habitat; 4) dispersal distances minimized; 5) occupied habitat emphasized; 6) maintain range wide distribution; 7) need for special management or protection; and 8) adequacy of existing regulatory mechanisms (USDI 1992a).

Canada Lynx (*Lynx canadensis*)

Status:

The Canada lynx was proposed for threatened status in the contiguous United States in 1998. Human alteration of forest landscapes is the most important factor in the decline of lynx populations. In particular, the alteration of species composition, successional stages, distribution and abundance, and connectivity of forests. Timber harvest and associated activities are the primary land uses affecting lynx habitat. Lynx were over harvested during the 1970's and 1980's. The over harvest has resulted in lynx populations which are insufficient to recolonize areas with suitable habitat. Current lynx populations in Washington are estimated between 96 and 191 individuals (WDW 1993).

Range:

Historically and currently, lynx were present in Alaska and Canada from the Yukon and Northwest Territories south to the U.S. border and east to Nova Scotia and New Brunswick. Lynx historically were found in sixteen states in the contiguous United States. They were present in the northeast in Maine, New Hampshire, Vermont, New York, Pennsylvania, and Massachusetts; in the western Great Lakes region in Minnesota, Wisconsin, and Michigan; in the Rocky Mountains in Oregon, Idaho, and Montana on into Utah and Colorado; and in the Cascade Mountain Range of Oregon and Washington (McCord and Cardoza 1982, Quinn and Parker 1987).

Habitat Requirements:

Canada lynx occur primarily in boreal forests throughout their range (Ruggiero *et al.* 1994). At the southern extent of their range, they are typically found at high elevations which have habitats similar to the boreal forests of Alaska and Canada. Canada lynx are specialized predators and their distribution is linked to that of the snowshoe hare. Snowshoe hares use dense, early successional forests with woody seedlings and shrubs which provide food and cover, and escape from predators and extreme weather (Wolfe *et al.* 1982, Monthey 1986, Koehler and Aubry 1994). Lynx usually select habitats with an abundance of snowshoe hares for foraging. They use the abundant cover to stalk and lie in wait for hares (Ruggiero et al. 1994). Lynx require late-successional forests that contain cover for kittens (especially deadfalls) and for denning (Koehler and Brittell 1990). Breeding occurs in late March to early April with young born in late May or early June (Koehler and Aubry 1994). Lynx populations in Alaska and Canada exhibit a cyclic oscillation in population with lynx lagging several years behind snowshoe hare population trends. This relationship does not appear to exist in the contiguous United

States due to lower snowshoe hare populations resulting from patchier habitat and the presence of additional competitors and predators not present in the northern regions (Dolbeer and Clark 1975; Wolff 1980, 1982).

Ute Ladies'tresses (*Spiranthes diluvialis*)

Status:

The Ute Ladies' tresses was federally listed as threatened in 1992. The main factors cited were loss and modification of habitat, and modification of the hydrology of existing and potential habitat. The orchids pattern of distribution as small, scattered groups, its restricted habitat, and low reproductive rate under natural conditions make it vulnerable to both natural and human caused disturbances (USFWS 1995). These life history and demographic features make the species more vulnerable to the combined impacts of localized extirpations, diminishing potential habitat, increasing distance between populations, and decreasing population sizes (Belovsky *et al.* 1994; USFWS 1995).

Range:

In the state of Washington, Ute Ladies' tresses is located in Okanogan County.

Habitat Requirements:

Ute ladies' tresses is a perennial, terrestrial orchid that is endemic to moist soils in mesic or wet meadows near springs, lakes, or perennial streams (USFWS 1995). Observations by Jennings (1990) and Coyner (1989 and 1990) indicate that the Ute ladies'-tresses requires soil moisture to be at or near the surface throughout the growing season, indicating a close affinity with the floodplain. These observations were corroborated by Martin and Wagner (1992) with monitoring research at the Dinosaur National Monument. However, Riedel (1992) reported that once established it appears to be tolerant of somewhat drier conditions, but loses vigor and may gradually die out if the groundwater table begins to consistently drop during late summer (Riedel 1992; Arft 1994 pers. comm. *in* USFWS 1995).

Ute ladies' tresses were originally reported to occur at elevations between 4,300 and 7,000 feet in eastern Utah and Colorado (Stone 1993). However, recent discoveries of small populations in the Snake River Basin (1996; southeastern Idaho) and in Okanogan County, Washington (1997) indicates that orchids are found at lower elevations (1,500-4,000 feet) in the more western part of their range (USFWS 1995). Ute ladies'-tresses are found in a variety of soil types ranging from fine slit/sand to gravels and cobbles (USFWS 1995). They have also been found in areas that are highly organic or consist of peaty soils. Ute ladies'-tresses are not found in heavy or tight clay soils or in extremely saline or alkaline soils (pH>8.0; USFWS 1995).

Ute ladies' tresses occur primarily in areas where vegetation is relatively open and not overly dense or overgrown (Coyner 1989 and 1990; Jennings 1989 and 1990) . A few populations have been found in riparian woodlands of eastern Utah and Colorado (USFWS 1995). However, the orchid is generally intolerant of shade, preferring open, grass and forb dominated sites (USFWS 1995).

The associated plant community composition and structure is frequently a good indicator across the range of the orchid (USFWS 1995). For example, beaked spikerush (*Eleocharis rostellata*) appears to dominate the plant community in areas occupied by the orchid (Washington State). In Idaho, Ute ladies'-tresses occupies areas dominated by silverleaf (*Elaeagnus commutata*) and creeping bentgrass (*Agrostis stolonifera*). The USFWS (1995) reported that species most commonly associated with Ute ladies'-tresses throughout its range include creeping bentgrass, baltic rush (*Juncus balticus*), long-styled rush (*J. longistylis*), scouring rush (*Equisetum laevigatum*), and bog orchid (*Habenaria hyperborea*). Coyote willow (*Salix exigua*) and yellow willow (*S. lutea*) are commonly present in small numbers as saplings and small shrubs (USFWS 1995). The USFWS (1995) reported that other species commonly associated with the Ute ladies'-tresses throughout its range include paint-brush (*Castilleja* spp.), thinleaf alder saplings (*Alnus incana*), narrowleaf cottonwood saplings (*Populus angustifolia*), sweet clover (*Melilotus* spp.), sedges (*Carex* spp.), red clover (*Trifolium pratense*), and western goldenrod (*Solidago occidentalis*).

The Ute ladies' tresses appear to be tolerant and well adapted to disturbances, especially those caused by water movement through floodplains over time (Riedel 1994 pers. comm. *in* USFWS 1995). Habitat alteration resulting from agricultural use (grazing, mowing, and burning) may be beneficial, neutral, or detrimental (McClaren and Sundt 1992). USFWS (1995) reported that grazing and mowing seem to promote flowering, presumably by opening the canopy to admit more light. However, these management practices may impede fruit set by directly removing flowering stalks, enhancing conditions for herbivory by small mammals and altering habitat required by bumble bees, the primary pollinator (USFWS 1995; Arft 1993).

Ute Ladies' tresses flower from mid-July to mid-August. Fruits mature and dehisce from mid-August into September. Plants may remain dormant for one or more growing seasons without producing above ground shoots. Orchids generally require symbiotic associations with mycorrhizal fungi for seed germination.

Bull Trout (*Salvelinus confluentus*)

Status:

Bull trout are divided into five distinct population segments (DPSs). All five DPSs are listed as threatened: Columbia River and Klamath River DPSs, June 10, 1998; Jarbidge River DPS, April 8, 1999; Coastal-Puget Sound and St. Mary-Belly River DPSs, December 1, 1999. Bull trout are threatened by habitat degradation and fragmentation from past and ongoing land management activities such as mining, road construction and maintenance, timber harvest, hydropower, water diversions/withdrawals, agriculture, and grazing. Bull trout are also threatened by interactions with introduced non-native fish such as brook trout (*S. fontinalis*) and lake trout (*S. namaycush*).

Bull trout are estimated to have occupied about 60% of the Columbia River Basin, and presently occur in 45% of the estimated historical range (Quigley and Arbelbide 1997). Bull trout have declined in overall range and numbers of fish. Though still widespread, there have been numerous local extirpations reported throughout the Columbia River

basin. Although some strongholds still exist, bull trout generally occur as isolated subpopulations in headwater lakes or tributaries where migratory fish have been lost.

Range:
Bull trout, members of the family Salmonidae, are char native to the Pacific Northwest and western Canada. Bull trout historically occurred in major river drainages in the Pacific Northwest from about 41^0 N to 60^0 N latitude, from the southern limits in the McCloud River in northern California and the Jarbidge River in Nevada to the headwaters of the Yukon River in Northwest Territories, Canada (Cavender 1978; Bond 1992). To the west, bull trout range includes Puget Sound, various coastal rivers of Washington, British Columbia, and southeast Alaska (Bond 1992; McPhail and Carveth 1992; Leary and Allendorf 1997). Bull trout are wide-spread throughout tributaries of the Columbia River basin in Washington, Oregon, and Idaho, including its headwaters in Montana and Canada. Bull trout also occur in the Klamath River basin of south central Oregon. East of the Continental Divide, bull trout are found in the headwaters of the Saskatchewan River in Alberta and the MacKenzie River system in Alberta and British Columbia (Cavender 1978; McPhail and Baxter 1996; Brewin and Brewin 1997).

Habitat Requirements:
Bull trout exhibit resident and migratory life history strategies through much of their current range (Rieman and McIntyre 1993). Resident bull trout complete their life cycle in tributary streams in which they spawn and rear. Migratory bull trout spawn in tributary streams where juvenile fish rear from one to four years before migrating to either a lake (adfluvial); river (fluvial), or in certain coastal areas, to saltwater (anadromous), where maturity is reached in one of the three habitats (Fraley and Shepard 1989; Goetz 1989).

Bull trout have relatively specific habitat requirements compared to other salmonids (Rieman and McIntyre 1993). Habitat components that appear to influence bull trout distribution and abundance include water temperature, cover, channel form and stability, valley form, spawning and rearing substrates, and migratory corridors (Oliver 1979; Pratt 1984, 1992; Fraley and Shepard 1989; Goetz 1989; Hoelscher and Bjornn 1989; Sedell and Everest 1991; Howell and Buchanan 1992; Rieman and McIntyre 1993, 1995; Rich 1996; Watson and Hillman 1997). Watson and Hillman (1997) concluded that watersheds must have specific physical characteristics to provide the necessary habitat requirements for bull trout to successfully spawn and rear and that the characteristics are not necessarily ubiquitous throughout watersheds in which bull trout occur. Because bull trout exhibit a patchy distribution, even in pristine habitats (Rieman and McIntyre 1993), they should not be expected to simultaneously occupy all available habitats (Rieman *et al.* 1997).

Bull trout are found primarily in colder streams, although individual fish are often found in larger river systems. (Fraley and Shepard 1989; Rieman and McIntyre 1993, 1995; Buchanan and Gregory 1997; Rieman *et al.* 1997). Water temperatures above 15^o C (59^o F) limit bull trout distribution, which partially explains their generally patchy distribution within a watershed (Fraley and Shepard 1989; Rieman and McIntyre 1995). Spawning

areas are often associated with cold-water springs, groundwater infiltration, and the coldest streams in a given watershed (Pratt 1992; Rieman and McIntyre 1993; Rieman *et al.* 1997).

All life history stages of bull trout are closely associated with complex forms of cover, including large woody debris, undercut banks, boulders, and pools (Oliver 1979; Fraley and Shepard 1989; Goetz 1989; Hoelscher and Bjornn 1989; Sedell and Everest 1991; Pratt 1992; Thomas 1992; Rich 1996; Sexauer and James 1997; Watson and Hillman 1997). Jakober (1995) observed bull trout over-wintering in deep beaver ponds or pools containing complex large woody debris in the Bitterroot River drainage, Montana, and suggested that suitable winter habitat may be more restrictive than summer habitat. Maintaining bull trout populations requires high stream channel stability and relatively stable stream flows (Rieman and McIntyre 1993). Juvenile and adult bull trout frequently inhabit complex cover associated with side channels, stream margins, and pools (Sexauer and James 1997). These areas are sensitive to activities that directly or indirectly affect stream channel stability and alter natural flow patterns. For example, altered stream flow in the fall may disrupt bull trout during the spawning period and channel instability may decrease survival of eggs and young juveniles in the gravel from winter through spring (Fraley and Shepard 1989; Pratt 1992; Pratt and Huston 1993).

Preferred spawning habitat consists of low gradient streams with loose, clean gravel (Fraley and Shepard 1989) and water temperatures of 5 to 9^{o} C (41 to 48^{o} F) in late summer to early fall (Goetz 1989). Pratt (1992) summarized information indicating that increases in fine sediments are related to reduced egg survival and emergence. High juvenile densities were observed in Swan River, Montana, and tributaries with diverse cobble substrate and low percentage of fine sediments (Shepard *et al.* 1984). Juvenile bull trout in four streams in central Washington occupied slow moving water less than 0.5 m/sec (1.6 ft/sec) over a variety of sand to boulder size substrates (Sexauer and James 1997).

The size and age of maturity for bull trout is variable depending upon life history strategy. Growth of resident fish is generally slower than migratory fish and resident fish tend to be smaller at maturity and less fecund (Fraley and Shepard 1989; Goetz 1989). Individuals normally reach sexual maturity in four to seven years and are known to live as long as 12 years. Repeat and alternate year spawning has been reported, although repeat spawning frequency and post-spawning mortality are not well known (Leathe and Graham 1982; Fraley and Shepard 1989; Pratt 1992; Rieman and McIntyre 1996).

Bull trout typically spawn from August to November during periods of decreasing water temperatures. However, adult migratory bull trout frequently begin spawning migrations as early as April, and have been known to move upstream as far as 250 kilometers (km) (155 miles (mi)) to spawning grounds (Fraley and Shepard 1989). In the Blackfoot River, Montana, bull trout migrate to spawning areas in response to increasing temperatures (Swanberg 1997). Temperatures during spawning generally range from 4 to 10^{o} C (39 to 51^{o} F), with redds often constructed in stream reaches fed by springs or near other sources of cold groundwater (Goetz 1989; Pratt 1992; Rieman and McIntyre 1996).

Depending on water temperature, incubation is normally 100 to 145 days (Pratt 1992) and after hatching juveniles remain in the substrate. Time from egg deposition to emergence may surpass 200 days. Fry normally emerge from early April through May depending upon water temperatures and increasing stream flows (Pratt 1992; Ratliff and Howell 1992).

Growth varies depending upon life-history strategy. Resident adults range from 150 to 300 millimeters (mm) (6 to 12 inches (in.)) total length and migratory adults commonly reach 600 mm (24 in.) or more (Pratt 1984; Goetz 1989).

Bull trout are opportunistic feeders with food habits primarily a function of size and life-history strategy. Resident and juvenile migratory bull trout prey on terrestrial and aquatic insects, macro zooplankton, amphipods, mysids, crayfish, and small fish (Wyman 1975; Rieman and Lukens 1979 in Rieman and McIntyre 1993; Boag 1987; Goetz 1989; Donald and Alger 1993). Adult migratory bull trout are primarily piscivorous, known to feed on various trout (*Salmo spp*.), salmon (*Oncorhynchus spp*.), whitefish (*Prosopium spp*.), yellow perch (*Perca flavescens*), and sculpin (*Cottus spp*.) (Fraley and Shepard 1989; Donald and Alger 1993).

Methow Basin Bull trout:
Currently, 17 bull trout stocks have been identified in the Methow River watershed. Stocks are native (WDFW 1997). All stocks are in headwater tributaries far removed from the mainstem. Adfluvial, fluvial and resident life history forms are present. The bull trout stocks in the Methow River watershed have been classified as unknown with the exception of the Lost River stock, which is considered as healthy (WDFW 1997). The Lost River is well above and far removed from the hatchery. WDFW (1997) speculates that nearly all suitable spawning habitat is currently used by bull trout and present spawning distribution is nearly the same as pre-European settlement. Rarely are bull trout seen in the fish ladder and adult holding pond. All bull trout are released back into the Methow River.

The potential for Winthrop NFH operations to impact Columbia River bull trout can be incorporated into three categories: 1) the physical, chemical, and micro-biological effects associated with hatchery operations, 2) direct and indirect effects associated with juvenile salmonids released from the hatchery, and 3) direct and indirect effects associated with returning adults.

Physical, chemical, and micro-biological effects

Water Withdrawal:
Winthrop NFH has withdrawn up to 75% (up to 50 cfs) of its water supply from the Methow River and 25% from ground water supply. This figure (50 cfs) represents about 3% of the mean annual discharge of 1,592 cfs (Mullan et al. 1992a). Due to fish health considerations, the hatchery is reducing its use of Methow River water which should further lessen its undetectable impact to bull trout. The area affected by this action (from withdraw to return) is about 2100 m in length. Hatchery intake is adequately screened.

Hatchery Effluent:
Effluent from Winthrop NFH is monitored at least weekly to ensure compliance with NPDS standards and state point source discharge criteria. Winthrop NFH has consistently remained below designated standards for settleable solids. Considering that the effluent produced from Winthrop NFH complies with EPA standards, coupled with the low percentage of effluent to discharge (dilution factor), there is a low possibility that effluent produced at Winthrop NFH will negatively effect bull trout in this area.

Transmission of Disease or Parasites:
The potential for Winthrop NFH fish to transmit diseases and parasites to bull trout is low. Service fish health biologists routinely assess the health of salmonids produced at Winthrop NFH. At least once per month, biologists sub-sample ponds to determine bacterial kidney disease (BKD) levels using the ELISA technique, overall health, parasites, and the possible occurrence of other viral or bacterial infections. Under Service fish health policy, fish at federal hatcheries must be destroyed and their remains buried if they are diagnosed with viral diseases not endemic to the country or that threaten the continued existence of fish populations. Parasites are not prevalent among Winthrop NFH fish. The only disease that reoccurs among salmonid juveniles reared at Winthrop NFH is infections of BKD. This bacterial disease is common among salmonids in the Columbia River Basin. BKD is found in low to moderate severity in adult chinook salmon returning to Winthrop NFH. Viruses are rarely found in Winthrop NFH fish. To further reduce the potential of disease transmission, it is policy to bury all adult female carcasses, mortalities among ponded juveniles, and dead or fungous eggs.

Twenty-eight of 30 bull trout sampled from the Deschutes River basin were tested for BKD. This area has had no hatchery stock influence for about 10 years. Twenty-seven of the 28 bull trout tested positive for BKD (M. Engelking, ODFW, pers. comm. 1999). During 1992-1994, naturally-produced spring/summer chinook salmon parr were sampled from 25 sites in the Snake River basin in Idaho and Oregon, including rearing areas in the Salmon River, the Imnaha River, the Grand Ronde River and tributaries. *Renibacterium salmoninarum* (the causative agent for BKD) antigen was detected in fish from all populations sampled, including those remote from hatchery influence. Overall prevalence of this antigen ranged from 44% for fish in the Salmon River system in 1993 to 92% for fish in the Imnaha River in 1992. Prevalence of *R. salmoninarum* antigen ranged from 39% to 60% in hatchery fish and from 61% to 92% in wild fish, with prevalences consistently higher in wild fish than in hatchery fish at a given dam during a given year. Their results indicate that the prevalence and levels of *R. salmoninarum* are not higher in hatchery fish than in wild fish in the Snake River basin (Elliot, D. G. and R. J. Pascho 1997).

Effects Associated with Released Juveniles

Production goal for Winthrop NFH is 600,000 SCS yearlings (15 fish/lb) annually. Winthrop NFH also has a small summer steelhead program (100,000 annually) which will be addressed in a separate HGMP.

Competition, Predation, Residuals and Behavior

Direct competition for food and space between hatchery and natural fish may occur in spawning/or rearing areas and the migration corridor, but often more intensely between individuals of the same species. These impacts are assumed to be greatest in the spawning and nursery areas and at points of highest fish density (release areas) and to diminish as hatchery smolts disperse (MCMCP 1997). Release of hatchery smolts that are physiologically ready to migrate is expected to minimize competitive interactions as they should quickly migrate out of the spawning and rearing areas (NMFS 1995). Competition continues to occur at some unknown, but probably lower level as smolts move downstream through the migration corridor (MCMCP 1997).

Rearing and release strategies are designed to limit the amount of ecological interactions occurring between hatchery and naturally produced fish. Fish are reared to sufficient size that smoltification occurs within nearly the entire population, which reduces retention time in the streams after release (Bugert et al. 1991). Witty et al. (1995) state they did not find any literature or data to demonstrate functional relationship between numbers of juvenile migrants moving through reservoirs and impacts on smolt survival attributable to competition.

Hatchery fish may prey upon natural fish. There is currently no evidence that hatchery releases prey on bull trout and it is likely that hatchery fish may provide a substantial prey base for bull trout. Due to their location, size, and time of emergence, newly emerged chinook salmon fry are likely to be the most vulnerable to predation by hatchery released fish (USFWS 1994). Emigration out of hatchery release areas and foraging inefficiency of newly released hatchery smolts may minimize the degree of predation (USFWS 1994).

Witty et al. (1995) conclude that the potential impact of hatchery salmonid predation on natural salmonids in the mainstem corridor is not a significant factor. Steward and Bjornn (1990) state that large concentrations of hatchery fish may adversely affect wild juveniles by stimulating functional responses from bird and non-salmonid fish predators. On the other hand, a mass of fish moving through an area may confuse or distract predators and may provide a beneficial effect (MCMCP 1997).

Hatchery-reared salmon and steelhead released into spawning and rearing areas of natural species may fail to emigrate (residualize), and may negatively interact with natural fish (MCMCP 1997). Releases from Winthrop NFH are timed to mimic the out-migration of naturally produced salmon to further reduce potential residuals. Precocious maturation of male stream-type (spring chinook) chinook salmon is common, suggesting that it is a characteristic of this behavioral form (Mullan et al. 1992b). They also indicate that

precocious maturation of male spring chinook salmon is common in the mid-Columbia Basin and is characteristic of both hatchery and wild stocks. Examination of 3,443 juveniles from the Lemhi River, Idaho, showed that precocious development existed in 2.6% of the sample (Gebhards 1960). Precocious males constituted about 1% of 20,000 wild Chinook salmon examined in tributary streams of the mid-Columbia River 1983 - 1988 (Mullan et al. 1992b). Precocious males tend to have a higher mortality rate than non-maturing juveniles (Chapman et al. 1995). Mullan et al. (1992b) found that precocious males made up a greater percentage of the fish that died at Leavenworth NFH. Precocious males also tend to be less nomadic than other juveniles. In Icicle Creek, Mullan et al. (1992b) report that males generally remained in the test area, while female migrated.

The extent that precocious males contribute to reproduction is unknown. In the mid-Columbia Basin, males that mature in freshwater during their first or second summer may contribute to reproduction, and may contribute more than jacks under certain conditions (Chapman et al. 1995). They also believe that precocious males may play a significant role in reproduction in the mid-Columbia Basin, spawning successfully not only as "sneakers" in the presence of older males, but as the sole male present in some areas and in some years when spawning numbers are very low. All this said, the data indicates that residualism is a natural trait in spring Chinook, but the extent (from Complex hatcheries) on the natural population is unknown.

Effects Associated with Returning Adults

The possibility is extremely low that adult spring Chinook salmon returning to Winthrop NFH will adversely impact bull trout. Potential for effect could occur in the migration corridor or during broodstock collection and harvest.

In-river Effects:
There is no evidence to suggest that the collection and management of spring Chinook salmon broodstock at Winthrop NFH will adversely affect bull trout stocks. All broodstock for Winthrop NFH are salmon adults entering the fish ladder. At the time bull trout are spawning, Winthrop NFH is not collecting adults. Prior to the fish ladder being closed, any bull trout entering the ladder are released back into the Methow River.

Harvest:
Salmon returning to Winthrop NFH are few in number and this stream is closed to salmon fishing.

Straying and Spawning:
Because Winthrop NFH raises a listed stock, and the program is geared towards recovery, it is our goal to allow adults in excess of brood needs to spawn in the wild.

Yellow-Billed Cuckoo (*Coccyzus americanus occidentalis)*

The yellow-billed cuckoo in the western United States was accorded candidate status in July 2001. The western yellow-billed cuckoo includes all members of the species found in Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Texas and Washington.

Historically, the yellow-billed cuckoo bred throughout much of North America. Available data suggests that within the last 50 years the species' distribution west of the Rocky Mountains has declined substantially. Loss of streamside habitat is regarded as the primary reason for the population decline. In Washington, the last confirmed breeding records were in the 1930s. The cuckoo may now be extirpated from Washington.

Western yellow-billed cuckoos breed in dense willow and cottonwood stands in river floodplains.

The yellow-billed cuckoo is a medium sized brown bird, about 12 inches long and weighing about 2 ounces. The birds' most notable physical features are a long boldly patterned black and white tail and an elongated down-curved bill which is yellow on the bottom. Yellow-billed cuckoos are migratory; historically cuckoos arrived in Oregon in mid-May and flew south to their wintering grounds in September. Although many species of cuckoos are brood parasites (laying their eggs in other birds' nests), the yellow-billed cuckoo usually builds its own nest and raises its own young. The yellow-billed cuckoo is sometimes called the raincrow or stormcrow, because it often calls before a rainstorm.

The bird primarily eats large insects including caterpillars and cicadas as well as the occasional small frog or lizards. Breeding coincides with the emergence of cicadas and tent caterpillar.

Available data suggests that the yellow-billed cuckoo's range and population numbers have declined substantially across much of the western United States over the last 50 years. The greatest threat to the species has been reported to be loss of riparian habitat. It has been estimated that 90% of the cuckoo's streamside habitat has been lost. Habitat loss in the west is attributed to agriculture, dams and river flow management, overgrazing and competition from exotic plants such as tamarisk.

No known yellow-billed cuckoo's reside in the program area and are thought to be extirpated from Washington State.

15.3) Analyze effects

Gray Wolf:
Although Winthrop NFH lies within habitat for Gray Wolves, there are no known denning and/or rendezvous sites within the program area. Due to the location of the hatchery (low elevation, high road density, and concentrated human activity), the presence of the gray wolf is extremely unlikely. Therefore, in considering affects of the hatchery program and operation of the facility on the status of Gray Wolves, we feel that no effect will occur.

Wenatchee Mountain checker-mallow (WMCM):
Of five known populations of this plant species, none are located in the Methow Basin. Therefore, in considering affects of the hatchery program and operation of the facility on the status of the WMCM, we feel that no effect will occur.

Showy Stickseed:
The only known population of Showy Stickseed is located outside the Methow River Basin. Therefore, in considering affects of the hatchery program and operation of the facility on the status of the Showy Stickseed, we feel that no effect will occur.

Bald Eagle:
No known nesting or roosting sites are on or near the program area. Eagles are known to fish the Methow River and prefer to forage on fish and ducks. Currently, Winthrop NFH and adjoining waterways provide adequate fisheries important to the bald eagle. Hatchery produced fish probably play an important role in the eagles diet. Therefore, in considering affects of the hatchery program and operation of the facility on the status of the bald eagle, we feel that no effect will occur.

Grizzly Bear:
No grizzly bears have been observed in the program area, and it is unlikely that grizzly bears occupy the program area, with the possible rare exception of feeding on salmon carcasses. Due to the location of the hatchery (lower elevation, high road density, and concentrated human activity), the presence of the grizzly bear is extremely unlikely. Therefore, in considering affects of the hatchery program and operation of the facility on the status of the grizzly bear, we feel that no effect will occur.

Northern Spotted Owl:
Suitable spotted owl nesting, roosting and foraging sites are not found within the program area. Based on suitable habitat surveys conducted in the late 1980's in the Winthrop Ranger District (USFS), the nearest suitable habitat is four miles northwest of the program area and the nearest sighting of a spotted owl was about five miles northwest of the program area (Rohrer, USFS, Methow Valley Ranger District, 2002). Therefore, in considering affects of the hatchery program and operation of the facility on the status of the northern spotted owl, we feel that no effect will occur.

Canada Lynx:
Human use is evident surrounding the program area, and lynx are not found in areas of heavy human use. The hatchery sits at about 1,700 feet in elevation. Lynx are not typically found at elevations below 4,000 feet. No lynx have been sighted in the program area. Therefore, in considering affects of the hatchery program and operation of the facility on the status of the Canada Lynx, we feel that no effect will occur.

Ute ladies' tresses:
No known population exists on or near the program area, and there are no recorded sightings documented (as per Don Haley-USFWS, Ephrata ES Office). Therefore, in considering affects of the hatchery program and operation of the facility on the status of the Ute ladies' tresses, we feel that no effect will occur.

Bull Trout:
Because the facility complies with all applicable standards (effluent, screening, and water withdrawal), and due to the location of the hatchery (outside spawning and rearing habitat), we feel that the operation of Winthrop NFH may affect, but is not likely to adversely affect Columbia River or Entiat River bull trout.

Yellow-Billed Cuckoo:
Since no known yellow-billed cuckoos reside in the program area, and are believed to be extirpated from Washington State, we feel that the operation of the hatchery (including production) will have no effect on the status of the yellow-billed cuckoo.

15.4 Actions taken to minimize potential effects:

For non-routine operations and maintenance activities, Biological Assessments and/or other appropriate documents will be submitted to obtain the appropriate permits as needed.

The potential effects of hatchery operations/production on the *Gray Wolf, Showy stickseed, Grizzly Bear, Canada Lynx, and the Yellow-billed cuckoo*, is felt to be minimal to non-existent. None of these species have ever been documented on hatchery grounds. Therefore, no actions are deemed necessary or planned. In the future, if any negative effects to these species are known or imminent, we will consult with the appropriate agencies.

Bald Eagle and Northern Spotted Owl:
Although neither species are known to roost or nest in the program area, their presence would be documented and responded to. FWS does not harvest any trees on hatchery grounds, particularly those that provide habitat. As previously mentioned, any non-routine maintenance activity, including grounds management and herbicide/pesticide use, will be consulted on and permitted prior to implementation of the activity.

Wenatchee Mountain Checked-mallow and the Ute Ladies' tresses:
Although these species of plants are not found on hatchery grounds, potential habitat for them does exist. Any type of ground-breaking activities would be consulted on, if necessary, prior to the activity. If either of these species are located on hatchery grounds, the appropriate protective measures will be applied.

Bull trout:
Current protective measures being applied for bull trout is the aforementioned water delivery system compliance. Also, any bull trout that enters the collection ponds, will be released back to the river unharmed. Hatchery effluent is routinely monitored and currently meets NPDES standards. Prior to smolt releases, fish health exams are conducted to ensure that disease levels meet all applicable criteria.

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